



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,050	02/04/2002	Scott A. Leman	8350.1314-00	4929
58982	7590	09/26/2006	EXAMINER	
CATERPILLAR/FINNEGAN, HENDERSON, L.L.P. 901 New York Avenue, NW WASHINGTON, DC 20001-4413			ESHETE, ZELALEM	
			ART UNIT	PAPER NUMBER
			3748	

DATE MAILED: 09/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/067,050

Applicant(s)

LEMAN ET AL.

Examiner

Zelalem Eshete

Art Unit

3748

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 25-37 is/are allowed.
- 6) ☒ Claim(s) 1-14 and 16-24 is/are rejected.
- 7) ☒ Claim(s) 38 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____.

DETAILED ACTION

This Office Action is in response to the amendment filed on 8/30/2006.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 13,16 are rejected under 35 U.S.C. 102(b) as being anticipated by Kubik (4,833,971).

Regarding claim 13: Kubik discloses an engine valve actuator, comprising: an actuator cylinder having a fluid passage (see the figure); an actuator piston reciprocatingly disposed in the actuator cylinder (see numeral 16); and a control valve operatively associated with the actuator cylinder (see numeral 54), said control valve having a housing, said housing receiving low pressure fluid from a low pressure fluid inlet (see numerals 12,56) and receiving high pressure fluid from a high pressure fluid inlet (see numerals 10,58), said housing having a fluid outlet (see numeral 64), a plunger having first and second ends reciprocatingly disposed in the housing (see numeral 54), the plunger being movable between a first position at which the low pressure fluid inlet is to communication with the fluid outlet, and a second position at

Art Unit: 3748

which the high pressure fluid inlet is in communication with the fluid outlet, the fluid outlet being in fluid communication with the actuator cylinder fluid passage (see numeral 54); an actuator plunger operatively associated with the actuator piston and adapted to extend through an aperture disposed in the actuator cylinder when the control valve plunger is in the second position (see numeral 20).

Regarding claim 16: Kubik discloses the actuator plunger is unitary with the actuator piston (see the figure).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kubik in view of Shinojima (5,611,304).

Kubik discloses the claimed invention as recited above; however, fails to disclose electromagnetic actuating device; that is an electromagnetic device proximate the plunger first end and a spring proximate the plunger second end said plunger being

movable to the first position upon deactuation of the electromagnet device, said plunger being movable to the second position upon actuation of the electromagnetic device.

However, Shinojima teaches electromagnetic device ; that is, an electromagnetic device proximate the plunger first end and a spring proximate the plunger second end said plunger being movable to the first position upon deactivation of the electromagnet device, said plunger being movable to the second position upon actuation of the electromagnetic device (see figure 9).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the fluid actuation of Kubik by providing electromagnetic actuation as taught by Shinojima in order to increase the accuracy of the control system.

3. Claims 1-7,12,17,18,20-24 rejected under 35 U.S.C. 103(a) as being unpatentable over Kanzaki (6,006,706) in view of Reedy et al. (5,626,116).

Regarding claim 1: Kanzaki discloses an engine control system comprising engine cylinder, an engine piston reciprocatingly disposed in the engine cylinder (see figure 1); a valve operatively associated with the engine cylinder (see numeral 11); a mechanically driven actuator adapted to open the valve (see numerals 8,7,6); a fluidically driven actuator adapted to open the valve, the fluidically driven actuator externally disposed relative to the mechanically driven actuators (see numerals 12,10)

Art Unit: 3748

at least one sensor associated with the engine and adapted to generate an operation signal representative of an engine operation (see column 8, lines 30 to 35); and a controller adapted to receive the operation signal and transmit a control signal to the fluidically driven actuator and opening the valve based on the operation signal (see numeral 5). Kanzaki further discloses the fluidically driven actuator coupled to pressurized hydraulic source (see numeral 13).

Kanzaki fails to disclose the fluidically driven actuator coupled to a high pressure hydraulic fluid source and a low pressure hydraulic fluid source, and a controller being adapted to cause the valve to open during a compression stroke of the engine piston.

However, Reedy teaches the fluidically actuator coupled to a high pressure hydraulic fluid source (see figure 1; numeral 112) and a low pressure hydraulic fluid source (see numeral 114), and opening a valve during compression stroke (see abstract). Feucht further teaches such arrangement, a dedicated braking system, minimizes the size and weight of the engine (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kanzaki's device by providing structural and control arrangement as taught by Reedy in order to achieve a dedicated braking system that minimizes the size and weight of the engine as taught by Reedy.

Regarding claim 2: Reedy discloses the fluidically driven actuator is in constant communication with one of a source of high pressure fluid and a source of low pressure fluid (see figure 1).

Regarding claims 3,4: Kanzaki discloses a controller generates the control signal during a compression stroke, intake stroke of the engine, in that it is an online control system (see figure 1).

Regarding claim 5: Kanzaki discloses the valve is an intake valve (see abstract).

Regarding claim 6: Reedy disclose the valve is an exhaust valve (see abstract).

Regarding claim 7: Kanzaki discloses the control signal that is capable of actuating the fluidically driven actuator a predetermined length of time (see figure 1).

Regarding claim 12: Kanzaki discloses the sensor monitors temperature (see column 8, lines 30 to 35).

Regarding claim 17,24: Kanzaki as modified above disclose the claimed invention as recited above wherein the first valve actuator corresponds to the mechanically driven actuator and a second valve actuator corresponds to a fluidically driven actuator; and Reedy further discloses the first source (low pressure) taking up any lash associated with the engine, the second source causing the second valve actuator to open the valve (see column 7, lines 32 to 40; column 9, lines 50 to 67; column 10, lines 1 to 25).

Regarding claim 18: Reedy discloses the second valve actuator includes an actuator cylinder having an actuator piston reciprocatingly disposed in the actuator cylinder (see figure 1; numeral 120), and a control valve adapted to direct pressurized fluid from one of the first and second sources of pressurized fluid to the actuator cylinder (see numeral 116).

Regarding claim 22: Reedy disclose the valve is an exhaust valve (see abstract).

Regarding claim 23: Kanzaki discloses the valve is an intake valve (see abstract).

4. Claims 20,21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanzaki in view of Reedy as applied to claim 17 above; and further in view of Feucht (6,135,073).

Kanzaki as modified above discloses the claimed invention as recited above; however, fails to disclose the first source of pressurized fluid is a lubrication oil system of the engine; the second source of pressurized fluid is a high pressure rail of the engine.

However, Feucht discloses the first source of pressurized fluid is a lubrication oil system of the engine (see numeral 15). Feucht discloses the second source of pressurized fluid is a high pressure rail of the engine (see numeral 16).

It would have been obvious to one having ordinary skill in the art to modify the system of Kanzaki as modified above by providing fluid circuitry arrangement as taught by Feucht in order to integrate the fluid circuitry of the actuation system with that of the engine's thereby reducing energy consumption.

5. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanzaki in view of Reedy as applied to claim 1 above; and further in view of Fujieda et al. (6,634,333).

Regarding claims 8,11: Kanzaki as modified above discloses the claimed invention as recited above; and Reedy further discloses valve opening during compression stroke (see abstract); however, fails to disclose the specifics of engine crank angle or engine sensor.

However, Fujieda teaches crank angle correlation with the compression stroke and engine sensor (see figures 14; 1A).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the device of Kanzaki as modified above by providing crank angle correlating the compression stroke (during which a control signal to open the valve during is given) with that of predetermined crank angle as taught by Fujieda in order to achieve an online control strategy. It also would have been obvious to provide the engine speed sensor in order increase the accuracy of the control system during engine speed variation.

Regarding claims 9,10: Fujieda discloses at least one condition at which the controller is capable of assuming a predetermined crank angle of approximately 528 or (498 to 558) degrees of engine crank angle (figure 14, Cylinder 3, see COM range).

6. Claims 1-7,12,17,18,20-24 rejected under 35 U.S.C. 103(a) as being unpatentable over Kanzaki in view of Feucht and further in view of Reedy.

Regarding claim 1: Kanzaki discloses an engine control system comprising engine cylinder, an engine piston reciprocatingly disposed in the engine cylinder (see figure 1); a valve operatively associated with the engine cylinder (see numeral 11); a mechanically driven actuator adapted to open the valve (see numerals 8,7,6); a fluidically driven actuator adapted to open the valve, the fluidically driven actuator externally disposed relative to the mechanically driven actuators (see numerals 12,10) at least one sensor associated with the engine and adapted to generate an operation signal representative of an engine operation (see column 8, lines 30 to 35); and a controller adapted to receive the operation signal and transmit a control signal to the fluidically driven actuator and opening the valve based on the operation signal (see numeral 5). Kanzaki further discloses the fluidically driven actuator coupled to pressurized hydraulic source (see numeral 13).

Kanzaki fails to disclose the fluidically driven actuator coupled to a high pressure hydraulic fluid source and a low pressure hydraulic fluid source, and the controller being

Art Unit: 3748

adapted to cause the valve to be open during a compression stroke of the engine piston.

However, Feucht teaches the fluidically actuator coupled to a high pressure hydraulic fluid source (see numeral 16) and a low pressure hydraulic fluid source (see numeral 15). Feucht further teaches such arrangement results in recuperation of energy (see abstract).

Furthermore, Reedy teaches the controller being adapted to cause the valve to be open during a compression stroke of the engine piston (see abstract). Reedy further teaches that such arrangement maximize the efficiency of compression braking (see abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kanzaki's device by providing a high pressure and a low pressure fluid source as taught by Feucht in order to achieve recuperation of energy as taught by Feucht. It also would have been obvious to further modify by providing the arrangement of opening the valve during compression stroke as taught by Reedy in order to maximize the efficiency of compression braking as taught by Reedy.

Regarding claim 2: Feucht discloses the fluidically driven actuator is in constant communication with one of a source of high pressure fluid and a source of low pressure fluid (see figure 1).

Regarding claims 3,4: Kanzaki discloses a controller that is capable of generating the control signal during a compression stroke, intake stroke of the engine, in that it is an online control system (see figure 1).

Regarding claim 5: Kanzaki discloses the valve is an intake valve (see abstract).

Regarding claim 6: Feucht disclose the valve is an exhaust valve (see column 7, lines 20 to 25).

Regarding claim 7: Kanzaki discloses the control signal that is capable of actuating the fluidically driven actuator a predetermined length of time (see figure 1).

Regarding claim 12: Kanzaki discloses the sensor monitors temperature (see column 8, lines 30 to 35).

Regarding claim 17,24: Kanzaki as modified above disclose the claimed invention as recited above wherein the first valve actuator corresponds to the mechanically driven actuator and a second valve actuator corresponds to a fluidically driven actuator; and Feucht further discloses the first source (low pressure) taking up any lash associated with the engine, the second source causing the second valve actuator to open the valve (see column 3, lines 29 to 33).

Regarding claim 18: Feucht discloses the second valve actuator includes an actuator cylinder having an actuator piston reciprocatingly disposed in the actuator cylinder (see figure 1), and a control valve adapted to direct pressurized fluid from one of the first and second sources of pressurized fluid to the actuator cylinder (see numerals 20,22).

Regarding claim 20: Feucht discloses the first source of pressurized fluid is a lubrication oil system of the engine (see numeral 15).

Regarding claim 21: Feucht discloses the second source of pressurized fluid is a high pressure rail of the engine (see numeral 16).

Regarding claim 22: Feucht disclose the valve is an exhaust valve (see column 7, lines 20 to 25).

Regarding claim 23: Kanzaki discloses the valve is an intake valve (see abstract).

7. Claims 19 rejected under 35 U.S.C. 103(a) as being unpatentable over Kanzaki in view of Feucht and further in view of Reedy as applied to claim 18 above; and further in view of Shinojima.

Kanzaki as modified above discloses the claimed invention as recited above; and Feucht further discloses a control valve operatively associated with the actuator cylinder (see numeral 20), said control valve having a "housing", said housing having low pressure inlet (see numeral 15), a high pressure fluid inlet (see numeral 16) and a fluid outlet (see numeral 21); a "spool" reciprocatingly disposed in the "housing" (see numeral 20), the "spool" having first and second ends, the "spool" adapted to move from a first position connecting the low pressure fluid inlet to the fluid outlet to a second position connecting the high pressure fluid outlet to the fluid inlet (see figure 1, numerals 20,15,16), an "electromagnetic" device operatively associated with the spool first end (see numeral 22).

Kanzaki as modified above fails to specifically disclose the "structural" implementation of the control valve diagram.

However, Shinojima teaches the structural realization (housing/spool/electromagnetic device/spring) of a control valve (see figure 9).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to structurally realize the device of Kanzaki as modified above by using the structural implementation of the control valve as taught by Shinojima in order to translate the engineering drawing into manufacturing.

8. Claims 8,11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanzaki in view of Feucht and further in view of Reedy as applied to claim 1 above; and further in view of Urushihara et al. (6,267,097).

Kanzaki as modified above discloses the claimed invention as recited above; however, fails to disclose sensor monitors engine crank angle and engine speed.

However, Urushihara teaches crank angle sensor/engine speed sensor for use in the control of the valve timing system (see column 3, 35 to 50; figures 13-17; column 3:55 to 60).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Kanzaki by providing crank angle sensor/speed sensor as taught by Urushihara in order to implement the crankshaft position in the calculation of the control signal as taught by Urushihara.

Allowable Subject Matter

9. Claims 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. Claims 25-37 are allowed.

Conclusion

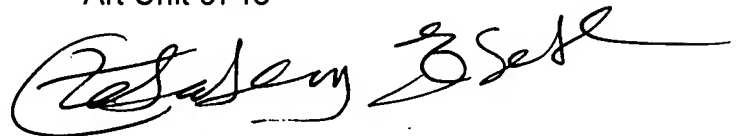
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zelalem Eshete whose telephone number is (571) 272-4860. The examiner can normally be reached on Monday to Thursday.

Art Unit: 3748

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Denion can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Zelalem Eshete
Examiner
Art Unit 3748

A handwritten signature in black ink, appearing to read 'Zelalem Eshete', is written over the printed name and title.